The carbon form of life is the only form of life in the Universe.

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The fact that the carbon form of life is the only form of life follows from the energies of chemical bonds.

Life is a closed chemical system organized in a certain way, which interacts with the environment through physical and chemical processes and can reproduce exact or similar copies of itself.

Therefore, high-energy chemical bonds are needed to ensure life. In addition, the required quantity and variety of substances must be available to realize the biochemistry of living things. It is important that energy reserves in chemical bonds provide organisms with sufficient energy for life and development, because in the case of low-energy bonds, organisms simply will not have the necessary energy accumulator for life on the planet.

If we look at the periodic table of elements, it is easy to see that only carbon and its associated elements (hydrogen, nitrogen, oxygen, etc.) can form high-energy bonds, thereby providing a variety of substances and their functional properties.

For example, the H - H bond in a hydrogen molecule has an energy of 436 kJ/mol, and

C - H bond 406 kJ/mol,

C - C bond 348 kJ/mol,

C - O bond 352 kJ/mol,

C - N bond 292 kJ/mol,

P - O bond 310 kJ/mol,

C - S bond 260 kJ/mol,

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C = C bond 616 kJ/mol,

C ≡ C bond 812 kJ/mol,

C=O bond 687 kJ/mol,

C = N bond 616 kJ/mol,

C ≡ N bond 867 kJ/mol,

C = S bond 729 kJ/mol,

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N - N bond 161 kJ/mol,

N = N bond 418 kJ/mol,

N - O bond 222 kJ/mol,

N = O bond 607 kJ/mol,

O - O bond 139 kJ/mol,

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Li - Li bond 102 kJ/mol,

Na - Na bond 73 kJ/mol,

K - K bond 57 kJ/mol,

F - F bond 159 kJ/mol,

Cl - Cl bond 242 kJ/mol,

Br - Br bond 193 kJ/mol,

I - I bond 151 kJ/mol,

S - S bond 280 kJ/mol,

Si - Si bond 418 kJ/mol.

As you can see, the most energetic bonds will be formed by carbon, hydrogen, nitrogen, oxygen and other organogenic elements. That is, all forms of life will be based on carbon, since due to tetravalency, only carbon will provide a variety of substances and their functional properties. Moreover, only elements of the second period (C, N, O) can form classical multiple bonds, which ensures the functional diversity of the carbon form of life, that is, the presence of the most important functional groups in organic chemistry. The Si - Si bond has a fairly high bond energy, but silicon practically does not form multiple bonds (Si - Si), and therefore the diversity of substances drops sharply.

Since the energy spectrum of the required chemical bonds is quite narrow, this will lead to standard environmental conditions, because conditions are needed under which the breaking - the formation of the corresponding bonds - will constantly occur. This means that both the temperature of the planet's atmosphere and the temperature of the ocean (solvent water) will be in a rather narrow “life range”, which will de facto be similar to the conditions of life on Earth.

Consequently, if we discover extraterrestrial life, it will only be under conditions as close as possible to those on Earth. And of course, the biochemistry of such alien life will be very similar to the biochemistry of earthly creatures. Although the appearance of aliens may be quite different from us. This means that we need to look for exoplanets identical to Earth, only then there is a chance of discovering extraterrestrial life, perhaps even intelligent life.